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ADDITIONAL FACTS,  
OBSERVATIONS, AND CONJECTURES  
RELATIVE TO  
THE GENERATION  
OF  
THE OPOSSUM  
*OF NORTH-AMERICA.*

IN A LETTER FROM PROFESSOR BARTON

TO

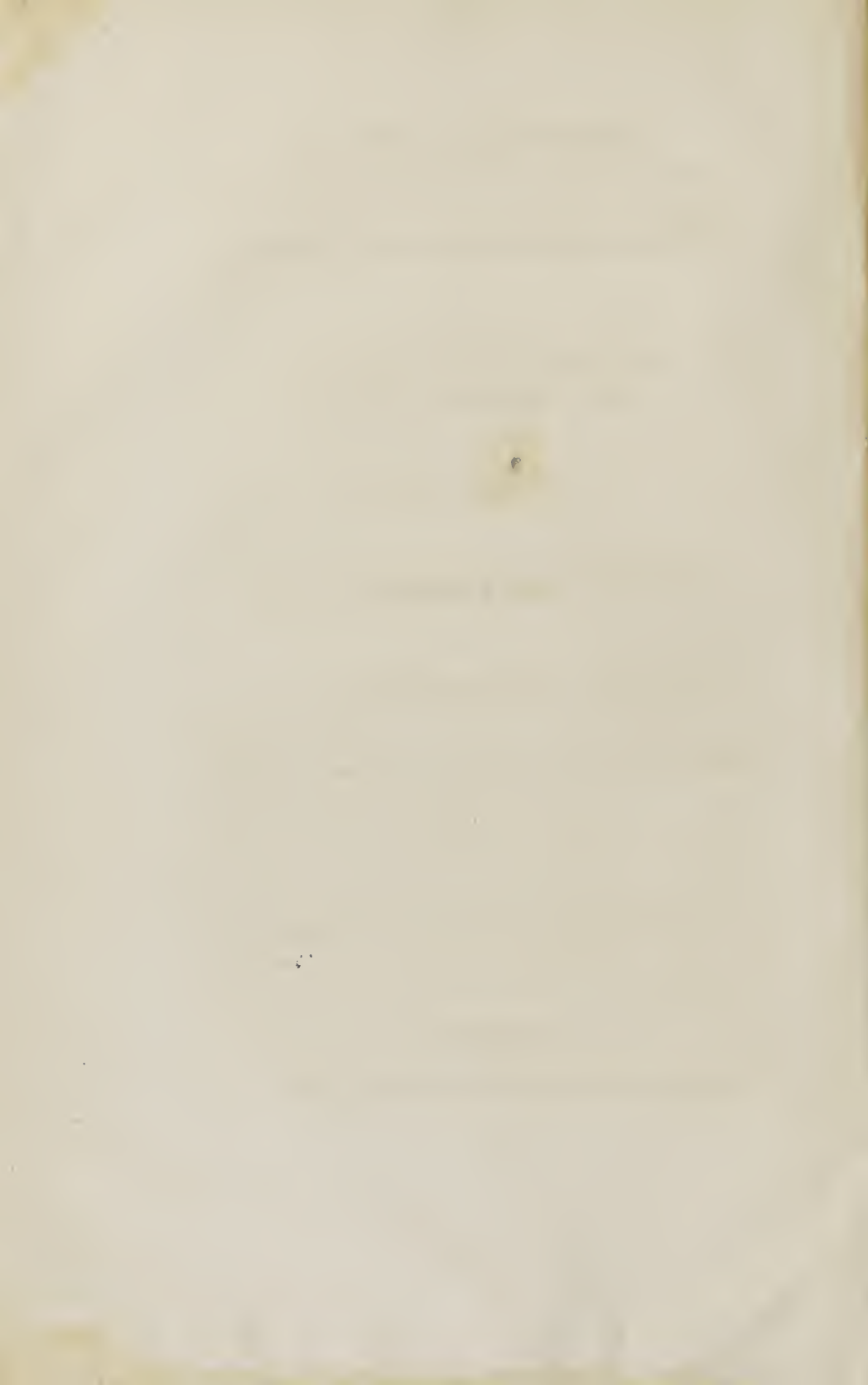
PROFESSOR J. A. H. REIMARUS, OF HAMBURGH.

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1813.



## ADDITIONAL FACTS,

### OBSERVATIONS, &c.

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MY DEAR SIR,

YOUR letter, dated Hamburg, June 25th, 1811, did not reach me for a very long time after this period. It found me much engaged in business of different kinds; not always capable of commanding the time requisite for the writing of a letter. And if, now and then, I might have snatched a few minutes to answer the much-esteemed epistle of my learned friend, I should have found it a difficult matter to convey the answer to you. My correspondence with my most valued correspondents on the continent of Europe, has, in a great measure, ceased. In many instances, indeed, I know not whether they still live. This is actually the case with Professor Blumenbach, and some others. It is

my prayer, that this letter may reach you, in the full enjoyment of your active and happy mind: in the enviable possession of your enthusiasm for the acquisition of natural knowledge.

You can easily conceive, why the intercourse between your country and my own is thus interrupted, and difficult. We, too, are engaged in war: a war long looked for by many: a war I believe unavoidable and just,—solemnly just,—on the part of America, between her and the mother country. Whatever may be the result of this war, which already has added dignity to the name and character of the United-States; though it is certain, that it will deprive us of many comforts, and advantages, and luxuries; and among others of the sweet luxury of tasting the science and literature of Europe, I have no doubt that we shall long continue to be a free, a great, and a happy people.

These observations, my venerable friend, arise almost unavoidably out of the perusal of your letter to me. America must, indeed, as you observe, become the refuge of your children. The calamities and the crimes of Europe will cause that portion of the earth to be deserted by millions of her best inhabitants: with these we shall receive immense accessions to the mass of our national industry, prosperity, and strength: and is it unreasonable to suppose, that in the progress of time, the cities of America, which but a few years ago were mere villages in the wilderness, will be the principal *emporia* of science and literature in the world?



You say, that you have read my Observations on the Opossum, printed in my letter to Monsieur Roume,\* "with great pleasure, but that you wish to obtain my promised two memoirs, in which you hope to find still exposed some circumstances, whereon you take the liberty to propose some questions to me."

As to the two memoirs, a kind of prospectus of which I have exhibited in my letter to Mons. Roume, they have never yet been published. But I have by no means relinquished my design of printing these memoirs, for which I have already collected a great mass of original materials, and to which I am continually making additions. They will ultimately, I flatter myself, appear to greater advantage, from the long delay which has unavoidably occurred in the publication of them: and will be illustrated by many coloured engravings, done in the same style of elegance as those which are to accompany my anatomical and physiological history of the Sirens, and my larger and more laborious work on the anatomy and physiology of the Rattle-snake, and other American serpents.

As some time must still elapse before my memoirs on the opossum can make their appearance, I shall in this letter, very cheerfully comply with your request to

\* This letter to the intelligent French naturalist, is dated August 1805, and was printed in Philadelphia the following year. A few copies only were struck off, and the greater number of these has been distributed among my foreign friends.

send you answers to some of the queries, which you have thought proper to propose to me concerning the generation and growth, or evolution, of this extraordinary animal.

I am not yet prepared to answer, with confidence, your first question, whether the embryo opossum, while in the uterus "swims loose, or is attached by a navel string:" for hitherto, I have not had an opportunity of opening a female with the *visible fetus in utero*. I have, however, examined a very considerable number of embryos in the marsupium, and some of them, as I have particularly observed in my letter to Mons. Roume, extremely small: *nam immediately after their exclusion from the true uterus*. In no instance, have I ever been able to observe any thing like an umbilical cord. My present opinion, therefore is, that no such organ does exist, but that the opossum, like the fetus of certain amphibia and fishes, is nourished in the uterus of the mother, without the intervention of any thing like a *funis umbilicalis*.

It is greatly in favour of this opinion, that in the kangaroo, an animal, as you well know, having remarkable affinities with the true opossums, though evidently belonging to a very different natural order, Mr. Home could never discover a navel cord, in any of the embryos which he examined.

But this desideratum in the physiological history of the opossum must be supplied by actual observations; and

such I hope to make in the course of the present spring. Until this matter, indeed, shall be fully determined, I cannot think of submitting to the public, my long promised two memoirs on the natural history of the North-American opossum.

You do not seem satisfied as to the manner in which the young opossums make their way from the uterus into the marsupium. "Can these helpless creatures (you ask) crawl about the abdomen to get it; or can the orifice of the uterus, by some inclination of the body of the mother, be thus approached to the pouch, that by some effort of hers, she may throw, or pour them into it immediately?" "And what, you further ask, may be the case with those that have the teats bare without a pouch, for instance, Buffon's Marmose?"

You know, that the celebrated Peter Camper has asserted, that man is the only animal that is capable of lying completely upon the back. This observation is not correct. The opossum is as capable of lying in this position as is man: it is, indeed, a favourite position of the female opossum, when she has her brood, of a certain age, in the pouch. And I have fully satisfied myself, that she can, with the greatest ease, while on her back, touch any and every part of the inner surface of the pouch with the orifice of the vagina. It is easy to conceive, therefore, that in this way the embryos may very readily be poured from the uterus to any part of the pouch, without the aid of the claw or hand of the mother.

Neither in this view of the subject, are we under the necessity of supposing, that the embryos are compelled to travel *far*, before they reach, and by a wonderful instinct seize upon, the teats. It is not improbable, however, that by reason of this singular economy in the pouched opossum, not a few of the embryos are often lost: and, possibly, this may in some measure, serve to explain the fact, that we but seldom see the opossum with more than one third or one half as many young as the natural number of the teats.

As to the marmose (or *didelphis murina*), having never seen this animal, and knowing nothing concerning it but what I have learned from books, I cannot tell you by what process or means the mother conveys the embryos from the uterus to the teats. It must be confessed, that there seems to be here more difficulty than in the other case. Yet I can readily conceive, that the female marmose, as well as the *didelphis woapink*, may possess a power of touching and embracing any of the teats, and thus enable the young ones to seize hold of these organs. When once they have taken them, they may, and probably do, keep them as firmly as do the young of the pouched opossums. For we observe some of our small animals of the family of *glires*, or *rodentia*, running and jumping through the woods and fields, with their young ones, quite blind, at the teats; and notwithstanding the great exertion of the mother, the young ones are so firmly attached to the teats, that they seem to be seldom lost.

I am happy to be able to answer your next question, with more confidence on my own part, and more to your own satisfaction. After observing that Mr. Home found that the teats in the *virgin* state of the kangaroo “scarcely projected above the surface, but afterwards become of considerable length, you ask, “are they thus growing in pregnancy, so that the fœtus finds them ready, but can only attain to the tip for suction.”

In the opossum,—in the didelphis woapink at least,—it is certain, that the teat does gradually and remarkably increase, both in diameter and in length, with the progress of the enlargement and evolution of the embryo. Originally the teat is a mere *punctum*, as it were, and almost the whole of it is received within the lips of the little suckling, whose mouth is admirably formed for the reception of it. As the mouth enlarges, the teat also enlarges, and in time we find, that only a *part* of the teat is received within the mouth, as much or even a larger portion of it being exposed between its origin and the external orifice of the lips. So far, the embryo may, with some degree of propriety, be said to *form* the teat. And it must be confessed, that this correspondence both in the growth and evolution of the mother’s teat and of the embryo and its mouth, is not one of the least interesting facts in the physiological history of the opossum.

But, as if Nature had not been sufficiently fertile in the number of singularities of economy which she has



bestowed upon this animal, some authors have set about enumerating other properties, which the opossum (they say) possesses. Some of these supposed properties are now to be mentioned.

“ I remember (you say) to have read, that some author pretends, that the number of teats was not definite, but that they only come forth according to the number of young ones, or were provoked as hidden glands, by suction.”

You have very correctly stated what a certain Mons. d'Aboville has asserted on this subject : and it is probable that this is the author to whom you refer. I here quote the French writer's words.

“ The number of the young (he observes) varies greatly; I have seen females with ten or eleven, others which had only five or six. There are never more paps than young ones, and when they are weaned, these paps dry up, and detach themselves ; as in other animals, the umbilical string detaches itself from the young, with this difference, that the latter preserves the mark of the spot where the string was, whereas the female opossum retains no trace where the teats have been.” “ It appears, adds Mons. d'Aboville, as if they formed themselves in those places where the embryos happen to touch the mother's belly when she has conveyed them into her pouch, successively, as she *lays* them ; for that is the most proper ex-

pression, undeveloped embryos being comparable only to eggs.\*”

As this letter will fall into the hands of others who are less acquainted with the natural history of the opossum than you are, it seems necessary to correct the Chevalier d’Abouville’s monstrous assertion, which I have mentioned.

It is true, however, as he observes, that the number of the young varies very greatly : and I do not assert, that the number of the teats is uniformly the same : but I do believe, in answer to your question, that sixteen is the natural number : for this number I have actually counted in several females, both young and old. More than sixteen teats I have not observed. In the marmose, Buffon counted fourteen. The French naturalist seems to have been mistaken in supposing, that this species has a more numerous litter than the *didelphis woa-pink*.

It is not true, that there are not more paps than young ones : for I have frequently seen females with not more than six or eight young ones, and yet there was the full number of teats. It is true that in all these instances, I could not be sure, that there had not been more young ones than those which I saw : but in some instances, it

\* Travels in North-America, in the years 1780, 1781, and 1782. By the Marquis De Chastellux, &c. vol. ii. pages 431, 432. London : 1787.

was sufficiently certain, that the female did not throw from her uterus near as many embryos as she had teats, *at the time.*

It is equally untrue, that when the young ones are weaned, "the paps dry up, and detach themselves, as in other animals the umbilical string detaches itself from the young;" and that "the female opossum retains no trace of the points where the teats have been."

I have examined female opossums at almost every season of the year; and never, in a single instance, have I had any difficulty in discovering the teats. It is true that in the winter time these organs are very small puncta, compared to what they are at a later period, when the season of love returns, and especially when the embryos have been deposited in the marsupium, and have begun to take the teats. Then, as may readily be supposed, the teats are much more conspicuous.

Originally, I say, the teats are extremely minute, and well adapted to the small, as yet undeveloped, mouth of the embryo. For I have already observed, in my letter to Mons. Roume, that the mouth of the embryo is gradually evolved, from a minute triangular hole, to an uncommonly large *rietus*. By constant and long-continued suction, the teat increases both in diameter and length. At first, and for some time after, almost the whole of it is received into the mouth. As the suckling acquires more strength, it greatly elongates the teat, taking in only a portion of it, sometimes only the very extremity as it were, but ever



ready, when molested, to grasp a larger portion. This point I have often determined by experiment; and, on one occasion, by an experiment which I performed with some degree of reluctance.

The assertion of Mons. d'Aboville, that the teats are formed by the embryos, almost seems to be adopted by the respectable Professor Blumenbach, of Göttingen. Speaking of the teats of the mammalia, this eminent physiologist says: "Their situation is the most singular in the female marsupial animals; where their existence can scarcely be recognized except at the time when the young are actually contained in the abdominal pouch or false belly." He then notices the observation of Tyson; and passes no criticism upon the French Chevalier's nation, to which he refers.\* It is true, however, that our friend does say, that in an opossum (*Didelphis woapink*, I presume), which he possessed for several years, and whose ovaria discovered no trace of any previous impregnation, there were three pairs of teats in the false belly, very small indeed, and flat, but regularly arranged in a half moon."

In justice to Mr. d'Aboville, I must remark, that the very eminent English anatomist, Dr. Tyson, who examined a female opossum more than an hundred years ago, could discover no teats in the marsupium. "In this

\* A short system of Comparative Anatomy, translated from the German of J. F. Blumenbach, Professor, &c. pages 473, 474. London: 1807.

marsupium or pouch, says Tyson, most authors place the *mammæ*, or teats; and they tell very odd stories about them. But upon what observation I could make, I did not find any *teats* here; nor indeed could I find them in the outward skin, as is usual in other multiparous\* animals." "Possibly (continues our author) this subject never had a litter, so for want of drawing they might be less, so as to escape our view.†"

But taking leave of the mother opossum, or of the opossum that has already attained an age which befits her for the function of generation, have I not said in my letter to Mons. Roume, that "in an embryo opossum, weighing only sixty or eighty grains, and entirely destitute of the senses of sight and hearing, you may observe, with the naked eye, the marsupium of the female *distinctly* formed, and even count the number of the teats?"

\* The term *multiparous*, is with very great propriety applied to the opossum, though Dr. Tyson does not seem to have supposed, that this animal has more than five or six young ones at a time. In the mammalia, I do not know of any other animal which brings forth so great a number of young as this, the marmose perhaps excepted. It is a very curious circumstance, which perhaps somewhat increases our difficulties, in endeavouring to ascertain the final cause of nature, in the marsupial gestation of the opossum, that its near relative the kangaroo has only two or three young at a birth!

† The Philosophical Transaction, and Collections, &c., abridged, vol. ii. pages 884, 885. London: 1722.

While writing this letter, I have before me, an embryo opossum, which has been preserved in spirits, for some years. It weighs one hundred and five grains. The form of the marsupium is nearly an oval; and in it I have no difficulty in observing the teats. When I apply my glass, whose magnifying power is not great, I plainly count fifteen *or* sixteen teats. These, however, are not all equally conspicuous. Those on the sides adjacent to the inner edges of the marsupium are more distinctly seen: and the whole of them are arranged *in a good deal of order*. In this embryo, the eyes are entirely closed, and the mouth is a mere triangular slit.

I presume that the Chevalier d'Aboville, should he yet be alive, and should I be so fortunate as to convey to him a copy of this letter, will hardly *now* pretend, that the embryos, after they have reached the marsupium of the mother, form the teats. For no one, I think, will pretend, that the *teated* embryo, which I have described, ever had a brood of smaller embryos in its miniature marsupium, to *form* its teats!!

How monstrously deformed with error and with fable, is the history of the opossum! Thus besides the errors just noticed, Buffon talks of the young opossums, of my *didelphis woapink*, being "*pasted*, as it were, to the teats of the mother." How improper this expression is, I have shown in my letter to Mons. Rourme.

But there is one author who relates things, in regard to the opossum, quite as extravagant as those related

by Mons. d'Aboville. Marcgrav tells us, that the female opossum, which he describes, has no other uterus than the marsupium !\* This author, in many respects an author of merit,—*dissected* the female opossum : and he could discover no other uterus than the marsupium ! Even the Indians of Brazil, it is probable, could have given him more precise information concerning the Carigueya, which I take to be the same animal as my didelphis woapink. The Indians of North-America, at least, well know, that the marsupium is not the true or original uterus of the opossum. This pouch, or *sche-wandican* as the Delaware-Indians call it, serves, they say, to protect and keep the young opossums warm, and also enables the mother to travel about with them when she is in pursuit of food, which the opossums have often occasion to look for at a considerable distance from their usual place of residence. Their food, according to the Indians, is chiefly nuts of various kinds; acorns, the tubers of *Glycine Apios*, or wild potatoes, berries, &c. Having said so much, I may inform you, that the fruit of the persimmon (*Diospyros virginiana*) is one of the most favourite articles of the opossum's diet. But the opossum is not always thus nice. He is truly an *animal omnivorum*, devouring living animals, such as poultry,

“ \* Hæc bursa ipse uterus est animalis, nam alium non habet, uti ex sectione illius comperi : in hac semen concipitur & catuli formantur.” Georgi Marcgravi de Liebstad, *Historia Rerum Naturalium Brasilæ*, &c. p. 223. Lugduni Batavorum, &c. 1648.

small wild birds, and quadrupeds: and he even eats dead *cadavera*. He loves eggs; and it must be obvious to every one, how many opportunities of obtaining them in an American forest, the opossum possesses, when it is remembered, that he is a good climber, and that his strong prehensile tail enables him, by suspending himself from the branch of a tree, to take the eggs (and perhaps the young birds) from the nest upon a branch immediately below.

Having mentioned the opossum's prehensile tail, I may here observe, that this property of the tail is very early observed in the embryo. In weighing the embryos which I had detached from the teats, it was amusing to observe the little creatures climbing up the threads of the scales, and firmly clinging by the extremity of their tails to the balance, or strings.

I wish, in speaking of the opossum's food, I could stop here. But I must tell you an anecdote respecting this animal, which, I am persuaded, will give you more uneasiness than pleasure. But it is the province of natural, as well as of civil, history to relate unpleasant things.

The female opossum sometimes devours her own young ones. This, at least, she does in captivity, as I have had occasion to observe more than once: *at a time, too, when she had an abundance of other food in her cage.* Whether she thus devours her offspring, or a part of it, when she is in a state of liberty, I am not



able to say, with any degree of certainty. But I venture to suspect, that a mere state of slavery or confinement, has not induced the mother didelphis woapink to commit this bad act.

A bad act! Perhaps, it is not such. The opossum, as I have already said, is a very prolific animal. If all the embryos, which she receives into her *schewandican*, were to become adult, they would overrun the countries which this animal inhabits, and become a real pest to the farmer, destroying his poultry and their eggs.

It is true, indeed, that man takes some care to limit the numbers of these animals. In many parts of the United-States they are eaten, especially by the meaner or poorer classes of people. The opossum is now brought to the market of Philadelphia, almost as regularly as the wild rabbit\* of the country, or as poultry. I have never yet tasted it: but the meat looks well, and I am told has a delicious savour.

The opossum does not appear to have been a favourite food of the Indians, a people, upon the whole, by no means peculiarly nice in the choice of their diet. By some of the tribes the flesh of this animal (and the *living* animal itself) is held in abhorrence.† But I think

\* *Lepus Whapus, mihi*: *Lepus Americanus, Gmelin.*

† Some of the Indians, as I have learned from themselves, will not eat of the opossum, because it has hands, and on account of its singular mode of generation! A moral prejudice not unworthy of a more cultivated people.

it is not true, as has been asserted, that none of the tribes (though so many of the American tribes are named after the wild animals, (quadrupeds, both viviparous and oviparous, birds, fishes, &c., of the country); I think it is not true, that no American tribe is called by themselves after the opossum. There was a tribe of Indians in New-Jersey, who were called the "Opossum-Indians." A few individuals of the tribe yet remain: but the whole nation to which this tribe was most nearly related, will entirely disappear from the earth, long before the extinction of the race of opossum in the United-States. Yet I confidently look forward to a period, when the species of didelphis, of which I am speaking, will become wholly extinct in America. With the opossum, but perhaps at an earlier period, will also disappear, the sloths, the tatus, and not a few other mammalia, which are still common in the countries of America. Future naturalists will only know these animals by their histories and pictures, which may be preserved, as we now know the *elephas mastodontus*, the *megatheria*, and other *lost* animals, by their bones.

But I return to my more immediate subject: and this, I grant, has but little to do with the generation of the opossum. But I am not aiming at any thing like method. I am endeavouring to amuse you.

Although the opossum, I have said, sometimes devours her young, it is my duty to inform you, that the mother animal often, and perhaps generally, manifests a strong and affectionate attachment to her young. Great

appears to be her distress, when you take away any of the young animals, and especially after they have attained a certain size, and now utter a noise capable of being heard at a little distance.

But there is one particular fact with respect to this animal, which I have myself witnessed, and which sometimes almost deterred me from prosecuting my inquiries into the history of the opossum. I have seen the mother, when her marsupium has been opened (and tenderly opened) to bring into view the contained embryos, manifest her distress by a kind of supplicating manner,—and evidently shed tears! Our friend Blumenbach, had he witnessed this fact, would not have doubted, as he seems to have done, whether animals which shed tears, do this under the influence of grief. “*Lacrimas quidem secernere multa præter hominem animalia, tritissimum est. Quæritur autem num et ex mœrore plorent.*”\*

I know not how it has happened, that the opossum has been so little of a favourite with the generality of the naturalists. Some of them, indeed, have manifested very strong prejudices against the animal: and let me add, that not a few of their prejudices are very unfounded. “The murine opossum (says Buffon) has the same dispositions and manners as the Virginian species.” “They—eat fruits, grain, and roots. But they prefer fish and crabs, which, it is said, they catch with their tails. This fact (adds the Count) is extremely doubtful,

\* *De Generis humani varietate nativa.* p. 57. Gottingæ: 1795.



and accords not with the natural stupidity ascribed to these animals, which, according to the testimony of most travellers, can neither move, nor fly, nor defend themselves.”\*

Of the opossum’s skill in catching crabs with his tail, I can say nothing from my own observation. But I can very confidently assert, that the opossum is a much more respectable animal than the Count de Buffon supposes him to be.

Would not one be inclined to suspect, from the circumstance of his possessing a *hand*, that the opossum is an animal of at least an ordinary share of intelligence? I should even infer something in his favour, from his prehensile tail: an organ endowed with many useful powers, both to the parent and to its young. For long after the mother opossum has ceased to protect her young ones in the marsupium, or to carry them upon her back, she guides them, as it were, by her tail in her rambles through the woods, &c., the young animals clinging to it. This has given occasion to our Indians to say, that the young ones smell and bite the mother’s tail.

The extent of the geographical range of the opossum might also, perhaps, be mentioned as an argument in favour of the intelligence of this animal. For has not the inferiority of the apes, monkeys, baboons, and other *quadrumanæ*, to many other animals, been

\* Smellie’s Buffon.

sometimes inferred, in *part* at least, from the *limited* migration of these quadrumanæ over the surface of the earth? I believe it may be asserted, with entire truth, that no four-handed animal, hitherto discovered, has a geographical range so wide as the opossum of which I am speaking.

The geographical range of the opossum is, unquestionably, very great, and especially from north to south. In North-America, I find him as far north as latitude 44 degrees; though I must confess, that on the Atlantic side of the continent, latitude 41 degrees seems to be nearly his northern limits.\* From these boundaries, our opossum extends southward through Virginia, into the Carolinas, Georgia, Florida, Mexico, and the Antilles. I have no doubt, that he is the Carigueya of Marcgrav: of course he exists in Brazil. It is likely that he exists in South-America, as far south as latitude forty.

I take South-America, or at least the southern parts of North-America, to be the parental countries of the

\* The opossum is a very common animal in Pennsylvania, the northern boundary of which is 42 degrees. He is also very common in New-Jersey, but is seldom to be met with in the state of New-York, and has hardly, I think, been seen in any part of the United-States, to the east of the Hudson river.—The opossum is not the only animal, incapable perhaps of bearing an extremely cold climate, that is found much farther north in the western than in the eastern parts of North-America. The same remark applies to many other animals, and to very many vegetables. See Fragments of the Natural History of Pennsylvania. Part I. Introduction.

opossum, as well as of the raccoon. From these regions, these two animals have spread themselves northward.\* The raccoon has spread several degrees further north than the opossum. But he has not done this without having been obliged to subject himself to the influence of a profound brumal torpidity. But the opossum, I believe, never passes into the torpid state, though many of the regions which he inhabits experience a very severe winter's cold: and within these very regions, the raccoon becomes at least soporose, in the winter. In North-America, some of the most intelligent of our quadrupeds, such as the beaver, the ondatra, or musk-rat, not to mention others, though their geographical range is great, never become torpid.

But independently of all these circumstances, my long and frequent intercourse, or interviews with the opossum, have furnished me with many facts, which most satisfactorily prove, that the woapink is not a "stupid" animal, but, on the contrary, an animal of much sagacity, ingenuity, and prudence. These facts will be mentioned, at length, in my full history of the didelphis woapink; in my history of the mammalia of the United-States, a part of which is already printed; and in a work, in which I have long been engaged, on the *Instincts and Manners of Animals*.

I began this letter with no other intention than that of answering your questions. I have, I hope, accom-

\* The time is well remembered when the opossum was hardly known in some of those parts of the United-States, (Maryland, Pennsylvania, &c.) where he is now common.

plished that object, and you must pardon me for going so much further. I shall, indeed, be happy if my letter afford you any amusement. I shall anxiously wait the receipt of an answer from you. Meanwhile, permit me to assure you, that I have had much satisfaction in putting together these crude materials concerning the opossum of North-America, believing that they might afford some pleasure, and *possibly* some instruction, to one of the oldest and most eminent naturalists of Europe.—May we live to have a personal interview with each other.

I am, dear Sir, with the highest respect, your friend  
and fellow-labourer in natural science,

BENJAMIN SMITH BARTON, M. D.,  
Of Lancaster, in Pennsylvania.

*Philadelphia, May 3d, 1813.*

TO PROFESSOR REIMARUS.





Med. Lib.

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